SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

NEW SERIES. VOLUME XXIV.

JULY-DECEMBER, 1906.

NEW YORK
THE MACMILLAN COMPANY
1906

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ZOOLOGICAL LABORATORY, HARVARD UNIVERSITY, July 23, 1906.

PRELIMINARY DESCRIPTION OF TWO NEW SPECIES OF THE GENUS DICERATHERIUM MARSH, FROM THE AGATE SPRING FOSSIL QUARRY.

AMONG the commoner forms obtained by field parties of the Carnegie Museum in this rich deposit of bones, which has previously been described,[1] are two new species, provisionally referred to the genus *Diceratherium*.

The fact that *Diceratherium* is found in this horizon, which has been regarded as late Tertiary (by Marsh as Pliocene) is highly interesting, and it was thought by the present writer (*l. c.*, p. 491) that it might possibly belong in the lower Miocene. The study of the new material reveals the fact that the animals here represented are apparently somewhat more modified than the Diceratheria from the John Day beds.

The geological horizon in which this quarry is situated is at the top of the Harrison beds (Dæmonelix beds of Barbour, or the upper Arikaree of Darton). This entire section, the Gering, the Monroe Creek, the Harrison and the Nebraska beds, which overlie the Oligocene, should, I think, be regarded as lower Miocene, though the Nebraska beds may possibly represent the middle Miocene.

Diceratherium niobrarensis, n. sp.

The type, No. 1,271, of this species is a well-preserved skull, with the nasals disarticulated at the fronto-nasal suture. The nasals were found in the talus below the point where the skull was obtained, and presumably belonged to it. The premaxillaries are wanting, as is also the posterior portion of the left zygomatic arch. Except P^1 and the incisors the dentition on both sides is beautifully preserved. The principal characters of the type are as follows: Skull mesaticephalic.

$$I\frac{1}{2?},\quad C\frac{0?}{0?},\quad P\frac{4}{3?},\quad M\frac{3}{3?}.$$

The brain-case is large, the occiput high, and there is a well-formed sagittal crest with a narrow and rather shallow groove in the median line. The frontals are quite broad and convex laterally. When the nasals, which undoubtedly belong to the same specimen, are placed in position, they, with the frontals and parietals, unite in displaying an antero-posterior saddle-shaped concavity on the top of the skull. Near the anterior extremity the nasals are provided with a pair of well developed horn-cores, about 24 mm. long, rugose and subtriangular in section. Anterior to the base of the horn-cores the nasals are rapidly abbreviated, terminating in a blunt point projecting forward and downward. The narial openings, the foramen magnum, and the orbits are large. The infraorbital foramen is situated above the anterior part of P^3. The zygomatic arch is rather slender. There is no large tubercle on the supra-occipital as in *Diceratherium armatum,* but there is a prominent median ridge, which continues from near the superior margin of the foramen magnum to the top of the inion. The foramen magnum is subtriangular in outline. The occipital condyles are large and well separated by a broad median notch inferiorly. The par-occipital and postglenoid processes are very prominent, and their bases almost touch one another. The posterior nares extend forward to the anterior part of M^2. As has been stated, the first premolar is unfortunately not present in the type, but another individual of the same species (No. 1,273) shows this tooth much more reduced than in *Diceratherium armatum.* All the teeth have internal and external cingula, and are otherwise quite similar to those found in the species from the John Day.

[1] *Annals of the Carnegie Museum,* Vol. III., pp. 487–494, 1906.

MEASUREMENTS.

Greatest length of skull, approximately	450
Length of skull from occipital condyle to and including P^2	370
Length of skull from occipital condyle to M^3	190
Greatest transverse diameter of skull	235
Greatest transverse diameter of brain case	130
Greatest transverse diameter of frontals	150
Greatest transverse diameter of occipital condyles	103
Greatest transverse diameter of palate	68
Vertical diameter of the orbit	60
Length of 2d, 3d and 4th premolars and the molar series	185
Antero-posterior diameter of P^2	26
Transverse diameter of P^2	29
Antero-posterior diameter of P^4	32
Transverse diameter of P^4	36
Antero-posterior diameter of M^1	39
Transverse diameter of M^1	37
Antero-posterior diameter of M^3	35
Transverse diameter of M^3	39

Diceratherium Cooki.[2]

This species is very abundantly represented in the Agate Spring quarry, and there are at present some forty or fifty skulls, jaws, and other portions of the skeleton representing it in the Carnegie Museum. Only a small portion of this material has been freed from the matrix. Preliminary observations have been made upon eight skulls, to one of which the lower jaws are attached. Of this series a specimen designated as No. 1,572 (Carnegie Museum Catalogue of Vertebrate Fossils) is selected as the type. The skull represents an animal much smaller than *D. niobrarensis*. The top of the skull is perfect, but the anterior part of the maxillaries is wanting. The premaxillaries are lost, and the base of the skull has received considerable injury. Only the first and second molars are present on the right side, while the dentition of the left side, except P^1, is present.

The principal characters of the type are as follows: Skull mesaticephalic.

$$I\frac{1}{2}, \quad C\frac{0}{0}, \quad P\frac{4}{3}, \quad M\frac{3}{3}.$$

Brain case relatively as large as, or even larger than in *Diceratherium niobrarensis*. The occiput is rather low. The inion is broad, with a wide posterior emargination. The temporal ridges are quite prominent, not uniting to form a sagittal crest, but continuing separate as far as the inion, where they join the lambdoidal crest. The frontals are broad, especially over the orbits, and are slightly convex from side to side. The nasals are each provided with a heavy, ovate, rugose horn-core near their free extremities. The nasals are very abruptly pointed in front of the horn-cores, and are at this point directed downward and slightly forward. The dorsal surface of the skull as a whole is saddle-shaped, as in *Diceratherium niobrarensis*, but the frontals in the present species are relatively considerably broader. The zygomatic arch is quite heavy, with a rugose enlargement at the posterior angle. The narial openings are large, the posterior orifice extending forward to a point opposite the line between M^1 and M^2. The foramen magnum is rather large in size. The orbit is relatively smaller than in *Diceratherium niobrarensis*. The infra-orbital foramen is placed above P^3.

The base of the skull presents some interesting features showing a wide difference from the first species which is described in this paper. Of these the most important is the complete enclosure of the ear by the post-glenoid process and the mastoid, which touch each other in a manner somewhat similar to that described in *Ceratorhinus* according to Cope.[3] Furthermore, the dentition in the present species is distinctly more specialized than in *Diceratherium niobrarensis*, so that together with the small size of the skull it shows a degree of resemblance to European forms as *Diceratherium minutum* Cuvier. The first premolar in the present species is reduced in about the same proportion as that in the species previously described. The crotchet of M^3 has nearly closed the interspace between the cross-crests, and in very old individuals it is in fact an enclosed cavity of the tooth.

Characters worthy of being noted are derived from a number of lower jaws belonging

[2] In recognition of the kindness of Mr. James H. Cook to the field parties sent out by the Carnegie Museum.

[3] *American Naturalist*, Vol. XIII., p. 771, 1879.

to this species. The more important are the minute pair of median incisors having a rounded enameled crown, seldom showing any wear, and the very heavy and outwardly flexed angle of the lower jaw. A lower jaw from the Protoceras beds, which Professor Osborn figured,[4] suggests this very heavy angle, and it would be interesting should we be able to trace the present species to *Aceratherium mitis*.

MEASUREMENTS.

Greatest length of skull	350
Length from occipital condyle to and including P^2	307
Length from occipital condyle to M^3	150
Greatest transverse diameter of skull	215
Greatest transverse diameter of brain case	107
Greatest transverse diameter of frontals	140
Transverse diameter of nasals back of horn cores	65
Transverse diameter of nasals at the horn cores	70
Transverse diameter of palate at M^3	55
Vertical diameter of the orbit	30
Antero-posterior diameter of premolars two, three and four	68
Antero-posterior diameter of the molar series	90
Antero-posterior diameter of P^2	22
Transverse diameter of P^2	23
Antero-posterior diameter of P^4	28
Transverse diameter of P^4	29
Antero-posterior diameter of M^1	34
Transverse diameter of M^1	32
Antero-posterior diameter of M^3	26
Transverse diameter of M^3	32

O. A. PETERSON.

CARNEGIE MUSEUM,
August 15, 1906.

BOTANICAL NOTES.

SOME RECENT BOTANICAL BOOKS.

SEVERAL months ago there came from the hand of Professor Coulter another book for the use of pupils in the secondary schools. That it presents the subject with accuracy and good judgment goes without saying, for when a master in a subject writes a text-book this fact alone is a guarantee of its high standing. The present work, which bears the name of 'A Text-book of Botany' (Appleton), is a new edition, or rather a rewritten form of the widely used 'Plant Studies,' which in turn was an abridgment and combination of 'Plant Relations' and 'Plant Studies.' In the preparation of the present book Professor Coulter has made use of the suggestions and criticisms of many experienced teachers, in order to more accurately adjust the presentation of the matter to the conditions found in the secondary schools. The plan of the work can be best told in the author's own words:

> In the first five chapters the structure, function and relationships of the most obvious plant organs are considered. The purpose has been to use the most easily observed material to give preliminary training in observation, and some conception of the activities of plants. The following thirteen chapters present an outline of the plant kingdom in the simplest possible form to be at all adequate. In these chapters the morphological point of view necessarily dominates, but not to the exclusion of the physiological and ecological. In this presentation of the great groups, which is also an outline of classification, there have been included special accounts of forms of economic interest; not only because such forms as well as any others may illustrate groups, but chiefly because there is a growing conviction that Botany in the schools must relate pupils to their common experiences, as well as train them in science. For the same general reason the brief chapters on plant-breeding and forestry have been introduced. The four closing chapters include a very brief account of plant associations, the most inclusive view of plants. * * * It can not be repeated too often that this book will not serve its purpose unless it is used as a supplement to the teacher, to the laboratory and to field-work.

This is certainly an admirable statement of the purpose of botany in secondary instruction. The illustrations are numerous (320) and good, and the text is clearly written. It should prove most useful in the public schools.

In Margaret Slosson's 'How Ferns Grow' (Holt) we have quite a different type of book, this being intended for the general reader instead of the public school pupil, and therefore lacking the pedagogical form of presentation. The book is a popular manual of selected species of the ferns of the eastern United States, illustrated by forty-five plates

[4] *Memoirs A. M. N. H.*, Vol. I., p. 139, 1898.